CLAIMS

What is claimed is:

1. An exchange needle device comprising:

a proximal hub; and

an elongate needle structure having a working length projecting from the proximal hub, the elongate needle structure comprising:

an elongate tube extending distally from the proximal hub, the elongate tube comprising an outer surface, a proximal end, a distal end, and an inner surface defining a bore extending to a distal opening at the distal end of the elongate tube;

an outer cannula extending distally from the proximal hub, the outer cannula comprising an outer surface, a proximal end, a distal end, and an inner surface defining a bore extending to a distal opening at the distal end of the outer cannula,

wherein the outer cannula surrounds at least a proximal end region of the elongate tube forming an annular space between the outer surface of the elongate tube and the inner surface of the outer cannula, and wherein the distal end of the outer cannula is located a distance proximal to the distal opening of the elongate tube; and

a lubricious coating on the outer surface of the outer cannula and the outer surface of the elongate tube extending distal to the distal end of the outer cannula, the lubricious coating covering at least a portion of the working length of the elongate needle structure.

2. The device of claim 1, wherein the lubricious coating is a silicone material.

3. The device of claim 2, wherein the silicone material is polydimethylsiloxane applied to the portion of the working length using a solvent carrier.

4. The device of claim 3, wherein the polydimethylsiloxane is at a concentration of 4-7% w/w in the solvent carrier.

5. The device of claim 3, wherein the polydimethylsiloxane has a viscosity in a range of 1,000 cS to about 13,000 cS.

6. The device of any one of claims 1-5, wherein the at least a portion of the working length covered by the lubricious coating includes a length from a distal-most end of the needle structure to at least about 2 mm from the distal-most end of the needle structure and no greater than about 5 mm from the distal-most end of the needle structure.

7. The device of any one of claims 1-5, wherein the lubricious coating covers at least about 50% of the working length of the elongate needle structure starting at a distal-most end of the needle structure up to about 95% of the working length of the elongate needle structure starting at the distal-most end of the needle structure.

8. The device of any one of claims 1-5, wherein the proximal hub has a proximal end that is configured to removably couple to a syringe for delivery of a therapeutic from the syringe through the bore of the elongate tube.

9. The device of any one of claims 1-5, wherein the outer cannula has a region that changes in outer diameter towards the distal end of the outer cannula so that an inner diameter of the outer cannula is smaller at the distal end compared to an inner diameter of the outer cannula near the proximal end of the outer cannula.

10. The device of any one of claims 1-5, wherein the outer cannula comprises at least one opening extending through a wall of the outer cannula into the annular space between the outer cannula and the elongate tube.

11. The device of claim 10, wherein the lubricious coating extends over the side wall of the outer cannula at a level of the at least one opening and terminates a distance from the proximal hub.

12. The device of any one of claims 1-5, wherein the outer cannula comprises a plurality of openings extending through a wall of the outer cannula into the annular space.

13. The device of claim 12, wherein the plurality of openings are positioned circumferentially around a longitudinal axis of the outer cannula.

14. The device of claim 12, wherein the plurality of openings are positioned at a plurality of axial locations along a longitudinal axis of the outer cannula.

15. The device of any one of claims 1-5, wherein the distal end of the elongate tube comprises a sharpened beveled tip.

16. A method of lubricating a dual lumen exchange needle, the method comprising:

dip-coating a length of a dual lumen exchange needle into a volume of a silicone material dissolved into a solvent carrier in a concentration of 4-7% w/w, the dual lumen exchange needle comprising:

an inner tube comprising an outer surface, a distal end, and a bore extending to a distal opening at the distal end of the inner tube; and

an outer cannula comprising an outer surface, a distal end, and a bore extending to a distal opening at the distal end of the outer cannula,

wherein the distal end of the outer cannula is located a distance proximal to the distal opening of the inner tube, and

wherein the outer cannula surrounds at least a proximal end region of the inner tube forming an annular space between the outer surface of the inner tube and the inner surface of the outer cannula;

applying a positive pressure through the bore of the inner tube while advancing the needle into the first material;

applying a positive pressure through the bore of the outer cannula after withdrawing the needle from the first material; and

forming a coating on the length.

17. The method of claim 16, further comprising evaporating the solvent carrier under infrared light.

18. The method of claim 16 or claim 17, wherein dip-coating comprises a residence time of at least O seconds up to about 3 seconds within the material.

19. The method of any one of claims 16-18, further comprising plasma treating the coating to at least partially cross-link and immobilize silicone to the length.

20. A method of refilling an intraocular drug delivery device with an amount of a therapeutic agent, the method comprising:

penetrating a septum of the intraocular drug delivery device with a dual-lumen needle, the drug delivery device at least partially implanted in a vitreous chamber of an eye so the septum is located outside a sclera of the eye and a reservoir of the drug delivery device is located at least partially inside the vitreous chamber,

wherein the dual-lumen needle comprises:

an elongate tube comprising an outer surface, a distal end, and an inner surface defining a bore extending to a distal opening at the distal end of the elongate tube;

an outer cannula comprising an outer surface, a distal end, and an inner surface defining a bore extending to a distal opening at the distal end of the outer cannula,

wherein the outer cannula surrounds at least a proximal end region of the elongate tube forming an annular space between the outer surface of the elongate tube and the inner surface of the outer cannula, and wherein the distal end of the outer cannula is located a distance proximal to the distal opening of the elongate tube; and

a lubricious coating on the outer surface of the outer cannula and the outer surface of the elongate tube extending distal to the distal end of the outer cannula; and

preventing separation of the septum from the intraocular drug delivery device upon the penetrating due to the lubricious coating.